Claims

1. Time-of-flight mass spectrometer with injection of a narrowly defined ion beam, comprised of ions which fly in a so defined x-direction into a pulser which accelerates in pulses a segment of the ion beam in a so defined y-direction perpendicular to the x-direction and forms a band-shaped ion beam, with at least one electrical reflector for reflection of the ion beam in the y-direction and one detector for temporally resolved measurement of the ion beam, wherein
the pulser and the at least one reflector use for ion beam passage gridless slit diaphragms extended in x-direction which, either as such or in conjunction with other cylindrical ion optical lenses extended in the x-direction, can focus the ion beam on the detector in a z-direction perpendicular to both the x- and y-direction.

2. Time-of-flight mass spectrometer according to Claim 1, wherein at least one two-stage reflector with two slit diaphragms, one short deceleration field and one reflection field is used which acts on the band-shaped ion beam focusing in the z-direction and can focus it on the detector in the z-direction.

3. Time-of-flight mass spectrometer according to Claim 1, wherein at least one cylindrical lens extended in the x-direction is present for focusing the band-shaped ion beam in the z-direction so that the system of slit diaphragms of the pulser, slit diaphragms of the reflectors and cylindrical lenses can focus the ion beam on the detector in the z-direction.

4. Time-of-flight mass spectrometer according to Claim 3, wherein cylindrical Einzel lenses made up of two outer slit diaphragms at ambient potential and one inner slit diaphragm at lens potential are used.

5. Time-of-flight mass spectrometer according to Claim 4, wherein only one cylindrical Einzel lens is used which is positioned very close to the pulser, whereby in the boundary case of diminishing distance the pulser and cylindrical Einzel lens have a common slit diaphragm.

6. Time-of-flight mass spectrometer according to Claim 4, wherein the two jaws of the inner slit diaphragm of the cylindrical Einzel lens can be connected to slightly different potentials for adjusting the direction of the band-shaped ion beam in the z-direction.

7. Time-of-flight mass spectrometer according to Claim 1, wherein the pulser has two slit diaphragm electrodes and one repeller electrode, of which only the repeller electrode, the first slit diaphragm or both together are used for pulsing the ions located between the repeller electrode and the first slit diaphragm by means of voltage changes, while there is constant potential at the second slit diaphragm.

8. Time-of-flight mass spectrometer according to Claim 1, wherein at least two reflectors are used which are slightly rotated round the x-axis, so that the ion beam is slightly reflected

out of the x-y plane in the z-direction forming a zig-zag beam in the projection onto a y-z plane.

9. Time-of-flight mass spectrometer according to Claim 8, wherein the band-shaped ion beam which, after leaving the pulser and having a direction component in the x-direction, is deflected into the y-direction by an electric capacitor field in the x-direction.